

REMARKS/ARGUMENTS

Reexamination of the captioned application is respectfully requested.

A. SUMMARY OF THIS AMENDMENT

By the current amendment, Applicants basically:

1. Editorially amend dependent claim 5 (thereby moot the objection and rejection under 35 USC §112, first paragraph).
2. Editorially amend dependent claim 7.
3. Add new dependent claim 8 and claims 9 – 13 dependent thereon.
4. Respectfully traverse all prior art rejections.

B. PATENTABILITY OF THE CLAIMS

Claims 1, 2, 4 and 7 stand rejected under 35 USC 103(a) as being unpatentable over the admitted state of the prior art in view of U.S. Patent 6,229,211 to Kawanoue et al. Claim 3 stands rejected under 35 USC 103(a) as being unpatentable over the admitted state of the prior art in view of U.S. Patent 6,229,211 to Kawanoue et al as applied to claims 1, 2, 4 and 7 and further in view of U.S. Patent 6,284,649 to Miyamoto. Claims 5-6 stand rejected under 35 USC 103(a) as being unpatentable over the admitted state of the prior art in view of U.S. Patent 6,229,211 to Kawanoue et al as applied to claims 1, 2, 4 and 7, and further in view of the Wang et al Electroless article. Claims 1 and 5-7 stand rejected under 35 USC 103(a) as being unpatentable over the admitted state of the prior art in view of the Wang et al Suppression article. Claim 5 stands rejected under 35 USC 103(a) as being unpatentable over the admitted state of the prior art in view of the Wang et al Suppression article. All prior art rejections are respectfully traversed for at least the following reasons.

Applicants' technique of independent claim 1 prevents development of voids during electroless plating process wherein a barrier metal film is immersed in a plating

liquid. Kawanoue et al. do not use an electroless plating process for forming the embedded Cu layer, but instead use a Cu damascene process. There is no motivation and/or suggestion in Kawanoue et al. for preventing the formation of voids. Accordingly, the prior art rejection of independent claim 1 is again respectfully traversed.

New independent claim 8 states, e.g., that the barrier metal film has an element composition ratio (N/Ta) of nitrogen to tantalum of $0.3 \leq \text{N/Ta} \leq 1.5$, and also that the (initial) thickness of the barrier metal film is controlled so that, after oxidation, the barrier metal film covers essentially entirely covers an inner wall of the hole portion, and thereby prevents development of a void during the plating. Support for such a position resides, for example, in the third full paragraph of page 6 of the specification.

Even if U.S. Patent 6,229,211 to Kawanoue et al. were to suggest a N/Ta ratio of 0.87, removal of the oxide film might still result in complete removal of the barrier metal film (at least in some locations) if the barrier metal film were not applied thickly enough at the outset, and consequently a void might develop at the place of complete removal. Choosing an initial thickness of the barrier metal film is also an important factor, and U.S. Patent 6,229,211 to Kawanoue et al. does not teach or suggest such factor.

New dependent claims 9 – 13 will be recognized as supported, e.g., by claims 2 – 3 and 5 – 7, respectively.

C. MISCELLANEOUS

In view of the foregoing and other considerations, all claims are deemed in condition for allowance. A formal indication of allowability is earnestly solicited.

The Commissioner is authorized to charge the undersigned's deposit account #14-1140 in whatever amount is necessary for entry of these papers and the continued pendency of the captioned application.

Should the Examiner feel that an interview with the undersigned would facilitate allowance of this application, the Examiner is encouraged to contact the undersigned.

Respectfully submitted,

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